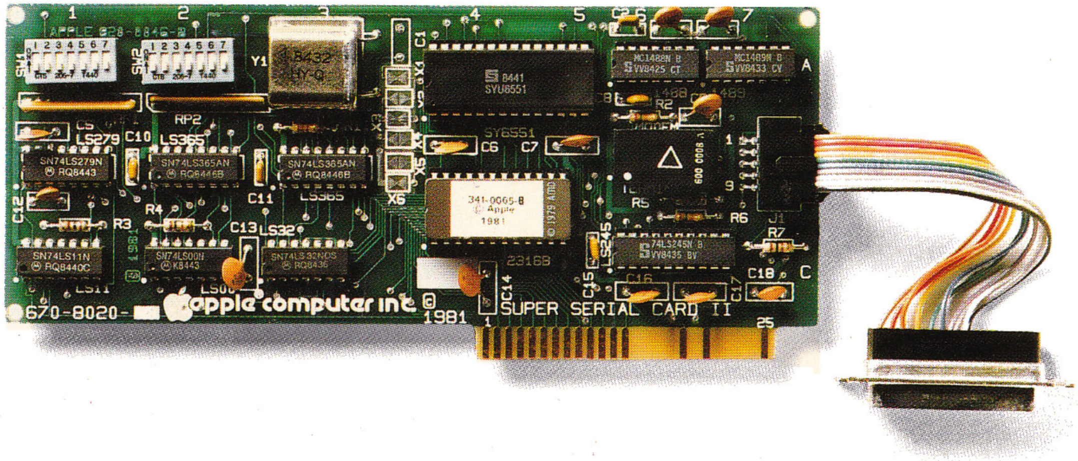
Apple® II Super Serial Card User's Manual



Compatible with Apple II, II Plus, and IIe.

Compatible with Apple II, II Plus, and IIe.

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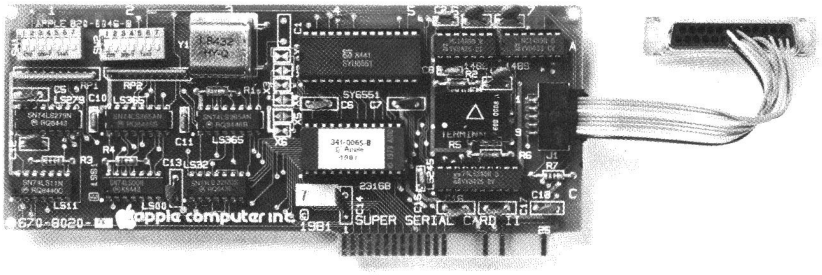
Apple® II Super Serial Card™ User's Manual



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Radio and Television Interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with our instructions—it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if a "rabbit ear" television antenna is used. (A "rabbit ear" antenna is the telescoping-rod type usually contained on television receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripherals. To further isolate the problem, disconnect the peripheral devices and their input/output cables one at a time. If the interference stops, it was caused by either the peripheral device or the I/O cable. These devices usually require shielded I/O cables. For Apple peripherals, you can obtain the proper **shielded cable** from your dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

A **shielded cable** is a cable that uses a metallic wrap around the wires to reduce the potential effects of radio frequency interference.

If your computer does cause interference to television or radio reception, you can try to correct the interference by using one or more of the following measures:

☐ Turn the television or radio antenna until the interference stops.

☐ Move the computer to one side or the other of the television or radio.

☐ Move the computer farther away from the television or radio.

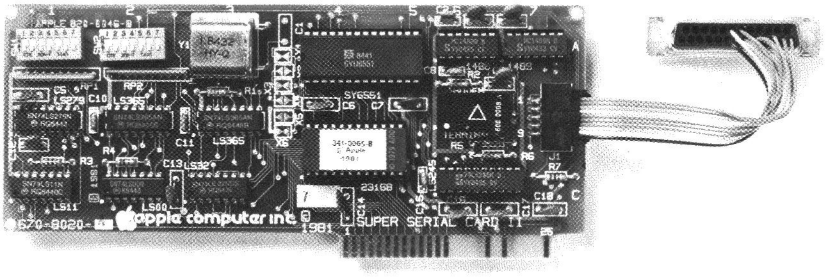
☐ Plug the computer into an outlet that is on a different circuit than the television or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)

☐ Consider installing a rooftop television antenna with coaxial cable lead-in between the antenna and television.

If necessary, you should consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions.

Chapter 1

Installing Your Super Serial Card



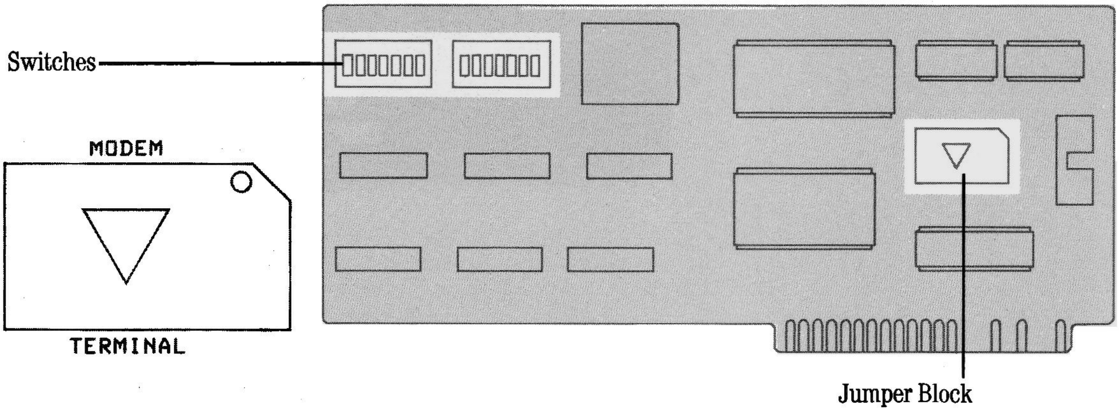
About Your Super Serial Card

The Apple® II Super Serial Card™ is an interface card that makes it possible for your Apple II, Apple II Plus, or Apple IIe to communicate with serial devices—that is, printers, modems, plotters, graphics tablets, and other devices that use a **serial interface**.

Serial interface means that the peripheral device receives information from the computer one bit at a time, as opposed to parallel interface, which means that the device receives information eight bits at a time. (It takes eight bits to represent each character on the keyboard. Read the *Apple IIe Owner's Manual* for more about bits and other computer basics.)

Because the Super Serial Card works with a wide variety of peripheral devices, you need to customize the card to work with a particular device. You customize the card by setting the switches in the upper-left corner of the card and by pointing the triangle on the jumper block either toward the word *MODEM* or *TERMINAL*. (See Figure 1-1.)

Figure 1-1. Switches and Jumper Block



For Future Reference: In this manual, references to the set of switches on the left are prefaced with a 1. (For example, 1-3 is switch 3 in the left set of switches.) Switches on the right are prefaced with a 2. (For example, 2-5 is switch 5 in the right set of switches.)

Setting the Jumper Block

The triangle on the jumper block should be pointing to the word *MODEM* if you're attaching a modem to your Super Serial Card. It should be pointing toward the word *TERMINAL* if you're attaching a printer or plotter.

> ***By the Way:*** If you alternate between using your Super Serial Card with a printer and a modem, don't forget to change the jumper block and the switch settings.

If the jumper block is pointing the wrong way, pull it off and put it back so that it's pointing in the right direction. Use a screw driver and gently pry it loose. When you reinstall the jumper block, be sure the pins are lined up exactly with the sockets on the card before you press it down into place.

Setting the Switches

The following chart shows the correct switch settings for several popular peripheral devices. If you have some other kind of device, ask your authorized Apple dealer or the manufacturer of the product how to set the switches on your Super Serial Card, or read Chapter 2, which explains what each switch controls, so you can figure out for yourself how to set the switches.

> ***By the Way:*** If you have trouble changing the switch settings with your fingers, use a pointed object like the tip of a pen.

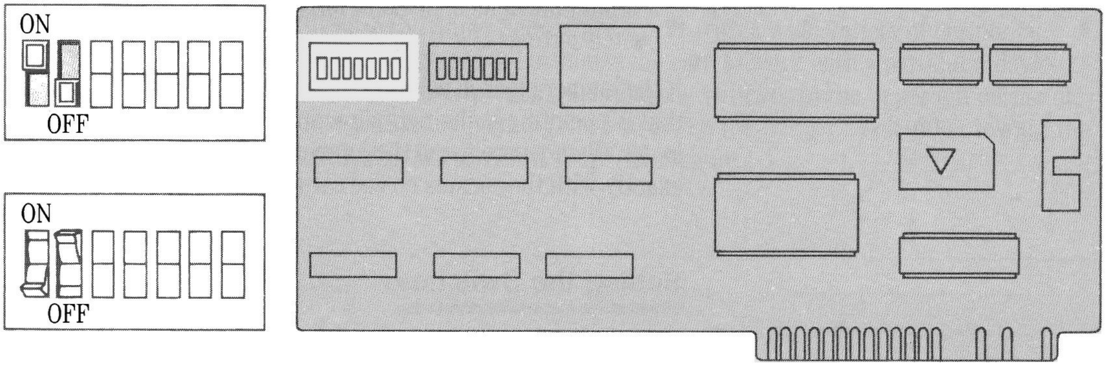
Table 1-1. Switch Settings for Apple Devices

Apple Device	**1-1**	**1-2**	**1-3**	**1-4**	**1-5**	**1-6**	**1-7**	**2-1**	**2-2**	**2-3**	**2-4**	**2-5**	**2-6**	**2-7**
ImageWriter™	OFF	OFF	OFF	ON	OFF	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF
ImageWriter™ II	OFF	OFF	OFF	ON	OFF	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF
Scribe®	OFF	OFF	OFF	ON	OFF	ON	ON	ON	OFF	OFF	ON	ON	OFF	OFF
Daisy Wheel	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	OFF	OFF	ON	OFF	OFF
Plotter	OFF	ON	ON	ON	OFF	ON	ON	ON	OFF	OFF	ON	OFF	OFF	OFF
Modem 300	ON	OFF	OFF	ON	ON	ON	ON	ON	OFF	ON	ON	OFF	ON	OFF
Modem 1200	OFF	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	OFF	ON	OFF
Personal Modem	OFF	ON	ON	ON	ON	ON	ON	ON	OFF	ON	ON	OFF	ON	OFF

Figure 1-2 shows you how a switch looks when it's in the ON position and how it looks when it's in the OFF position. (The switches on your card might look slightly different, but they work the same way.)

Some Super Serial Card switches are labeled *OPEN* and *CLOSED* instead of *OFF* and *ON*. *OPEN* is equivalent to *OFF*. *CLOSED* is equivalent to *ON*.

Figure 1-2. Switches Set to ON and OFF



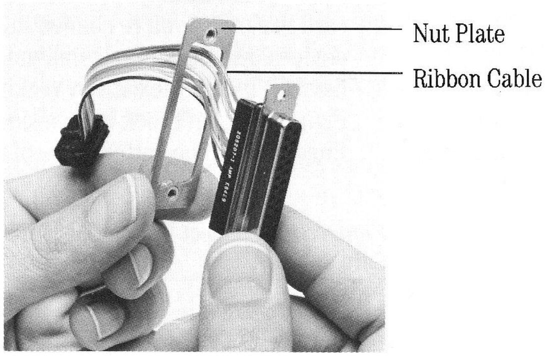
Overriding the Switch Settings: It is possible to override most of the switch settings on the card by imbedding commands within BASIC or Pascal programs or by typing commands at the keyboard. This is not something the average user of application programs would need or want to do, but it's useful for programmers. Refer to the reference card at the back of this manual for a list of commands and read Appendix B, "Super Serial Card Commands."

Installing the Super Serial Card

Once you've set the switches and got the jumper block pointing the right way for your peripheral device, follow these instructions to install the card:

1. Turn off the Apple II power switch, remove the cover of your Apple II, and touch the power supply case to discharge any static electricity that might be present on your clothes or body.
2. Slide the nut plate onto the ribbon cable as shown in Figure 1-3. Make sure the nuts on the nut plate face away from the 25-pin connector.

Figure 1-3. Slide Nut Plate Onto Ribbon Cable



3. Hold the connector and nut plate up to the inside of one of the large openings in the back panel as shown in Figure 1-4. (It doesn't matter which back panel opening you use, but choose one of the openings near slot 1.)
4. Attach the 25-pin connector to the back panel by using the screws and wrench that came with the Super Serial Card. See Figure 1-5. (Don't overtighten the screws or you could bend the connector.)

Figure 1-4. Hold Connector and Nut Plate up to Back Panel

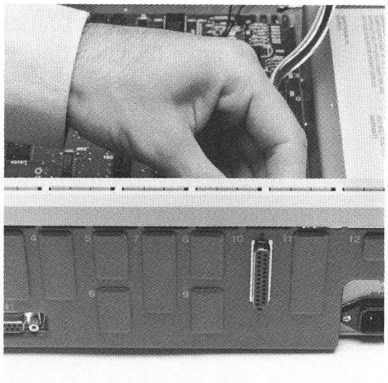
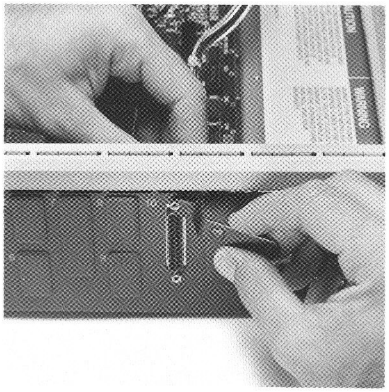


Figure 1-5. Attach Connector to Back Panel



Apple II, II Plus

If you are connecting your Super Serial Card to an Apple II or an Apple II Plus, you'll need a special clamp to attach the cable to the back panel. Ask your dealer for service parts 805-0084 and 805-0085.

Pascal programs require that your printer card be in slot 1 and that your modem card be in slot 2. For BASIC programs, it doesn't matter what slot the card is in. If you don't want to worry about what kind of application program you're using, put the Super Serial Card in slot 1 for a printer and slot 2 for a modem.

5. Connect the ribbon cable to the Super Serial Card as shown in Figure 1-6.
6. Put the card in slot 1 if you're connecting the card to a printer. Put the card in slot 2 if you're connecting the card to a modem. (For other devices, use the slot recommended in the manual that came with the device.) Install the card by rocking it from back to front as shown in Figure 1-7. Don't rock it from side to side, and don't touch the gold fingers along the bottom edge of the card.

Figure 1-6. Connect Ribbon Cable to Card

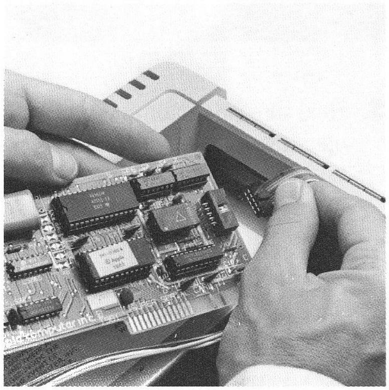
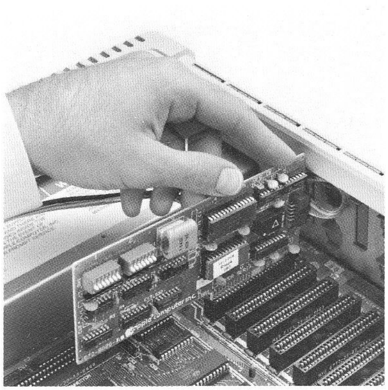


Figure 1-7. Install Card in Slot 1 or 2



> ***By the Way:*** If you alternate between using your Super Serial Card with a printer and a modem, don't forget to change the card's slot when you change the jumper block setting and the switch settings.

7. Connect the cable from your printer or modem to the connector attached to the back panel of your computer.

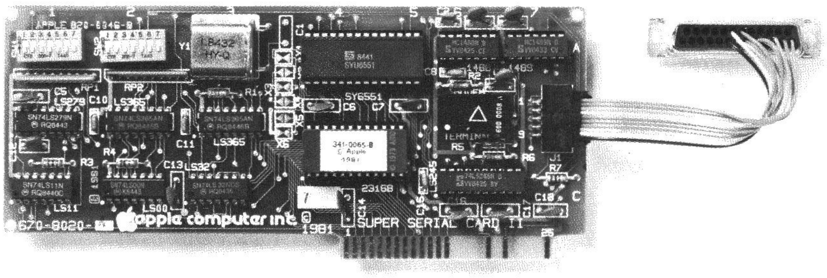
That's all there is to it. Put the cover back on your computer and finish setting up your printer, plotter, or modem according to the instructions that came with it. Keep in mind that your printer or modem may also have switches that need to be set correctly before your computer and peripheral device can speak the same language at the same speed.

You Can Stop Reading Right Now: If your printer, plotter, or modem was listed in Table 1-1, you can stop reading right now and start using your peripheral device with your application programs. The next chapter explains what each switch on the Super Serial Card controls. It's interesting stuff to know, but it's only required reading for users who don't know how to set the switches for the device they're connecting to their computer.

Important! If you have trouble getting your computer to work with your printer or modem, consult Appendix A, "Troubleshooting," for help.

Chapter 2

What the Switches Do



SUPER SERIAL CARD II
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1981
SY6551

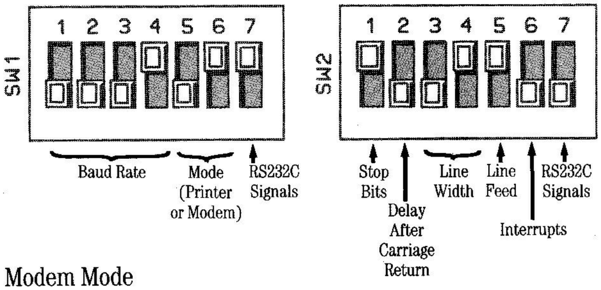
Figuring Out How to Set the Switches

If your printer, plotter, modem or other serial device isn't listed in Table 1-1, you need to figure out for yourself how to set the switches on the Super Serial Card. In order to do this, you need to know what the various switches control, and you need to know certain characteristics about your device—like how fast it wants to receive data from the computer, in what form it wants to receive data, and whether the card or device will handle things like carriage returns and line feeds. All of this information should be listed in the manual that came with your peripheral device or in the manual that was provided by the information service you will be accessing with your modem. If it's not, ask your authorized Apple dealer or the manufacturer of the device for assistance.

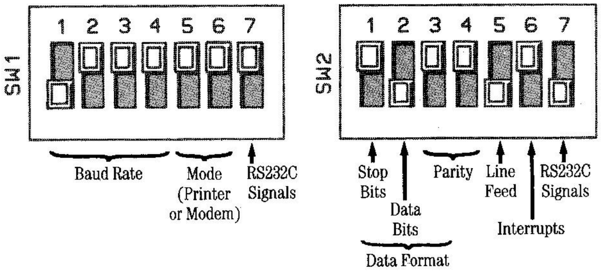
Figure 2-1 gives you an overview of what the various switches on the Super Serial Card control. Notice that the switches control different things depending on whether you are using your card with a printer/plotter or with a modem (The upper set of switches in Figure 2-1 is set for an Apple ImageWriter II. The lower set of switches is set for the Apple Personal Modem.)

Figure 2-1. What the Switches Do

Printer Mode


SW1
1 2 3 4 5 6 7
Baud Rate
Mode (Printer or Modem)
RS232C Signals
SW2
1 2 3 4 5 6 7
Stop Bits
Delay After Carriage Return
Line Width
Line Feed
Interrupts
RS232C Signals

Modem Mode


SW1
1 2 3 4 5 6 7
Baud Rate
Mode (Printer or Modem)
RS232C Signals
SW2
1 2 3 4 5 6 7
Stop Bits
Data Bits
Data Format
Parity
Line Feed
Interrupts
RS232C Signals

By the Way: Some application programs let you select from a menu the printer or modem you want to use. In cases like these, the program overrides the switch settings on the card, so it doesn't matter how they're set. If you'd just as soon avoid setting the switches on your Super Serial Card, try using the application with your device. If it works, you don't need to set the switches. If it doesn't, you do.

Important! Read the following section if you are connecting a printer or plotter to your Super Serial Card. Read the section called "Setting the Switches for a Modem" if you're connecting a modem.

Setting the Switches for a Printer

From now on, general references to *printers* and *printer mode* also apply to plotters.

Before you can set the Super Serial Card switches for a printer, you need to know a few things about your printer. Consult the manual that came with your printer to find out the answers to these questions:

☐ **What is the baud rate for your printer?** Baud rate is the speed at which information is exchanged between the computer and peripheral devices. The most common baud rate for printers is 9600.

☐ **How many stop bits does your printer expect?** The computer sends information to the printer in binary form —0's and 1's (called **bits**). It takes a string of seven or eight bits (called **data bits**) to form each of the characters on the keyboard. Stop bits are special bits that signal the end of each character. Most printers expect one stop bit; a few types of slower printers require two.

☐ **Does your printer need a delay after each carriage return?** Slower printers need time for the print head to reposition itself at the beginning of the next line. Most printers don't.

☐ **What is the maximum number of characters your printer can fit on each line?** Most printers can fit 80 characters on a line.

☐ **Does your printer automatically generate a line feed after each carriage return?** (That is, does the print head automatically advance to the beginning of the next line, or, left to its own devices, would it keep printing on the same line over and over again?) Some printers expect the computer to generate line feeds; others take it upon themselves.

Once you have the answers to these five questions, you should have no trouble setting the switches for your device.

Baud Rate

Switches 1-1 through 1-4 determine the baud rate. Table 2-1 shows you how to set the switches for various baud rates:

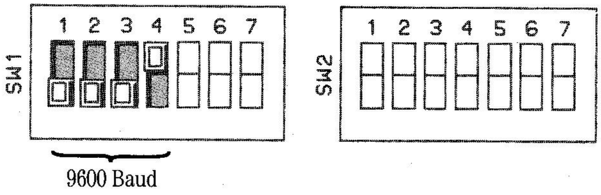
Table 2-1. Baud Rate Switch Settings

Baud	**1-1**	**1-2**	**1-3**	**1-4**
50	ON	ON	ON	OFF
75	ON	ON	OFF	ON
110	ON	ON	OFF	OFF
135	ON	OFF	ON	ON
150	ON	OFF	ON	OFF
300	ON	OFF	OFF	ON
600	ON	OFF	OFF	OFF
1200	OFF	ON	ON	ON
1800	OFF	ON	ON	OFF
2400	OFF	ON	OFF	ON
3600	OFF	ON	OFF	OFF
4800	OFF	OFF	ON	ON
7200	OFF	OFF	ON	OFF
9600	OFF	OFF	OFF	ON
19200	OFF	OFF	OFF	OFF

An Example

Figure 2-2 shows you how to set switches 1-1 through 1-4 for a 9600 baud device.

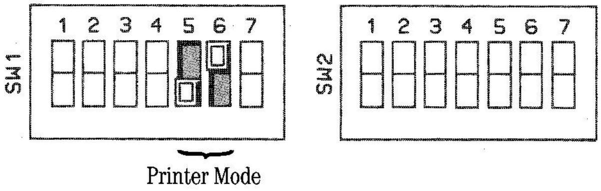
Figure 2-2. Switches Set for a 9600 Baud Device



Mode

Switches 1-5 and 1-6 determine whether your card is in printer mode or modem mode. For printer mode, switch 1-5 should be set to OFF, and switch 1-6 should be set to ON. See Figure 2-3.

Figure 2-3. Printer Mode Setting

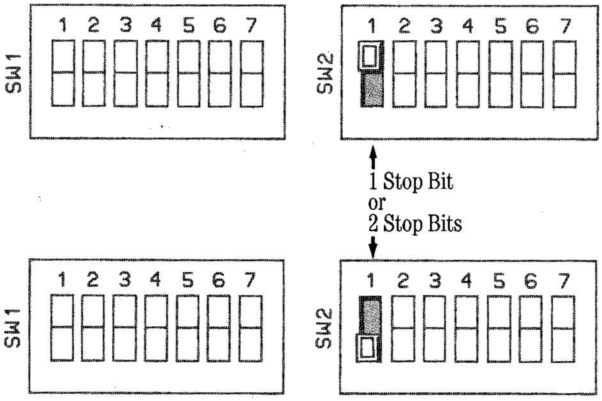

SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
Printer Mode

By the Way: Don't worry about switch 1-7 for now. It will be discussed in the section "RS232C Signals."

Stop Bits

Switch 2-1 determines whether the computer will send one or two stop bits after each string of data bits. Set it to ON if you want one stop bit. Set it to OFF if you want two stop bits. See Figure 2-4.

Figure 2-4. Stop Bit Settings


SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
1 Stop Bit
or
2 Stop Bits
SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7

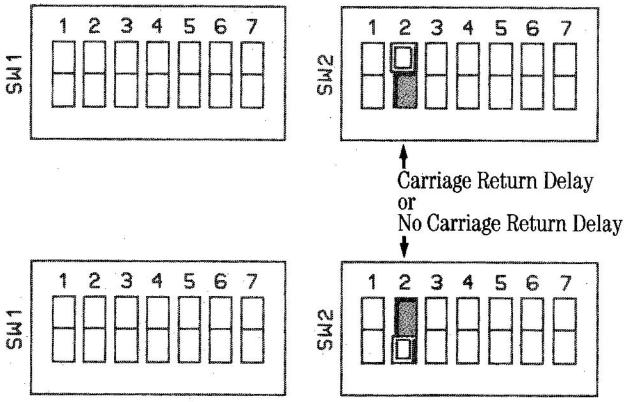
Slower printers need two stop bits; **most printers need only one**. (If you set the baud rate to 50, 75, or 110, set switch 2-1 to OFF, otherwise set it to ON.)

Delay After Carriage Returns

Switch 2-2 determines whether the computer will pause for ¼ second after each carriage return to give the print head time to get back to the start of the next line. Slower printers need the delay; **most printers don't**.

Set it to ON if you want a delay. Set it to OFF if you don't want a delay. See Figure 2-5.

Figure 2-5. Carriage Return Settings


SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
Carriage Return Delay
or
No Carriage Return Delay
SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7

Line Width

In communications mode, switches 2-3 and 2-4 control parity, not line width.

Switches 2-3 and 2-4 determine the number of characters that will be printed before each carriage return. (Most printers can handle 80 characters per line.) The following chart shows you how to set the switches for the various line widths:

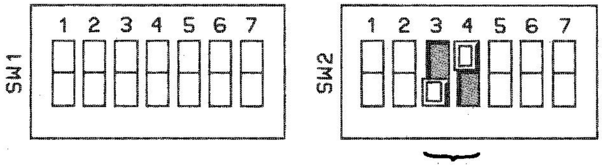
Table 2-2. Line Width Switch Settings

Characters Per Line	Switch 2-3	Switch 2-4
40	ON	ON
72	ON	OFF
80	OFF	ON
132	OFF	OFF

An Example

Figure 2-6 shows how to set switches 2-3 and 2-4 for 80 characters per line.

Figure 2-6. 80-Character-Per-Line Switch Setting



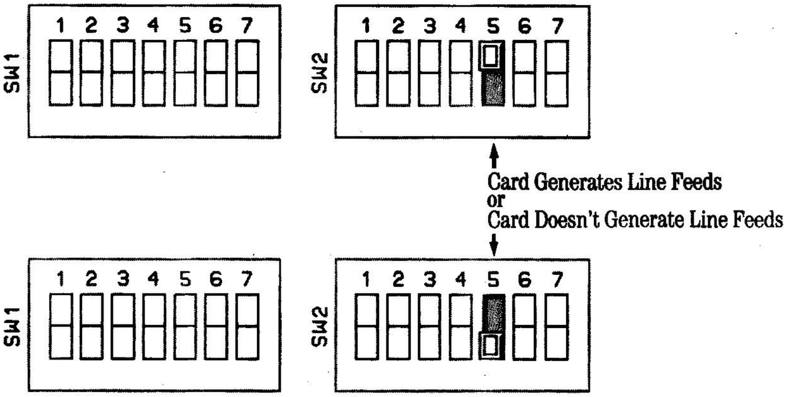
80 Characters per Line

> *What You See on Your Screen:* When the line width is set to 40 characters (or up to 80 characters if you have an 80-column card installed), the information you send to your printer will be echoed on your screen. If you choose a larger line width than your display can handle, what you send to your printer won't be echoed on the screen.

Generate Line Feeds

Switch 2-5 determines whether the Super Serial Card generates a line feed after each carriage return or leaves that up to the printer. Set it to ON if you want the card to generate line feeds. Set it to OFF if the printer generates its own line feeds. See Figure 2-7.

Figure 2-7. Line Feed Settings

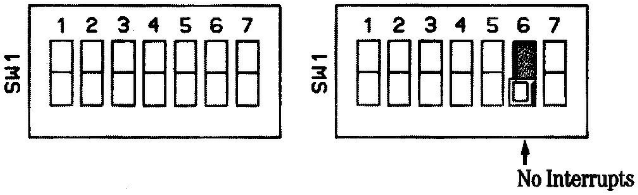


Card Generates Line Feeds
or
Card Doesn't Generate Line Feeds

Interrupts

Switch 2-6 determines whether interrupts will be forwarded to the Apple II. Set it to OFF unless the application program documentation specifically indicates that it should be set to ON.

Figure 2-8. Interrupt Switch Setting

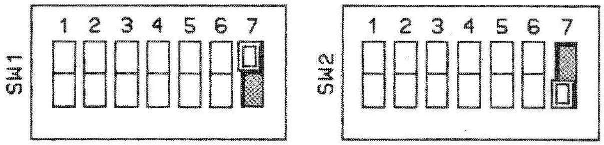


No Interrupts

RS232C Signals

Switches 1-7 and 2-7 determine whether data will be exchanged in accordance with the RS232C standard (the norm for serial data) or according to some other protocol. Set 1-7 to ON and 2-7 to OFF unless the documentation tells you to set the switches some other way. See Figure 2-9.

Figure 2-9. RS232C Switch Setting



Setting the Switches for a Modem

Before you can set the Super Serial Card switches for a modem, you need to know a few things about your modem and the information service or other computer you'll be accessing with your modem. Consult the manual that came with your modem and the manual that was furnished by the information service to find out the answers to these questions:

☐ **What is the baud rate for your modem?** Baud rate is the speed at which information is exchanged between your computer and peripheral devices. The most common baud rate for modems is 300 or 1200. In addition to knowing the baud rate for your modem, you also need to know the baud rate for the modem on the other end of the phone line. Your modem may be able to handle 1200 baud, but the other modem might only be able to handle 300. The baud rates of both modems must be the same or you won't be able to exchange data.

☐ **How many data bits is the information service (or other computer) set up to send and receive?** The computer sends information through the modem in binary form —0's and 1's (called **bits**). It takes a string of seven or eight of these data bits to represent each character.

☐ **How many stop bits will be used to show where one character (string of data bits) ends and the next character begins?** The options are one stop bit or two.

☐ **What kind of parity (if any) will be used for error checking?** The information service (or other computer) you're dealing with can send a **parity bit** as a way of checking to see if information was transmitted accurately. The options are no parity, odd parity, or even parity. With odd parity, the sending device adds a bit to the end of each string of data bits to make the total number of 1 bits an odd number. With even parity, the sending device adds a bit to the end of each string of data bits to make the total number of 1 bits an even number. After transmission, the program adds up the total number of bits sent and compares the sum with the sum of those received.

- ☐ **Does the device on the other end of the phone line (a far-away printer, for example) automatically generate a line feed after each carriage return, or does the Super Serial Card need to generate one?**

Once you have the answers to these questions, you're ready to start changing the switches on the Super Serial Card.

Baud Rate

Switches 1-1 through 1-4 determine the baud rate. Table 2-3 shows you how to set the switches for various baud rates:

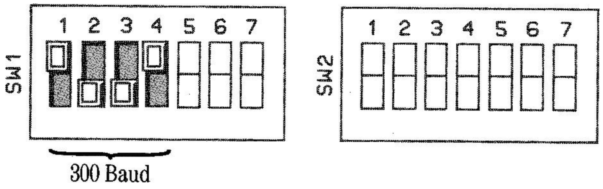
Table 2-3. Baud Rate Switch Settings

Baud	**1-1**	**1-2**	**1-3**	**1-4**
50	ON	ON	ON	OFF
75	ON	ON	OFF	ON
110	ON	ON	OFF	OFF
135	ON	OFF	ON	ON
150	ON	OFF	ON	OFF
300	ON	OFF	OFF	ON
600	ON	OFF	OFF	OFF
1200	OFF	ON	ON	ON
1800	OFF	ON	ON	OFF
2400	OFF	ON	OFF	ON
3600	OFF	ON	OFF	OFF
4800	OFF	OFF	ON	ON
7200	OFF	OFF	ON	OFF
9600	OFF	OFF	OFF	ON
19200	OFF	OFF	OFF	OFF

An Example

Figure 2-10 shows you how to set switches 1-1 through 1-4 for a 300 baud modem.

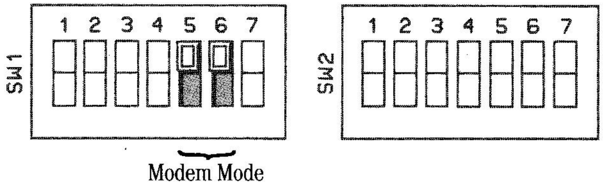
Figure 2-10. Switches Set for a 300 Baud Modem



Mode

Switches 1-5 and 1-6 determine whether your card is in printer mode or modem mode. For modem mode, both switch 1-5 and switch 1-6 should be set to ON. See Figure 2-11.

Figure 2-11. Switches Set for Modem Mode

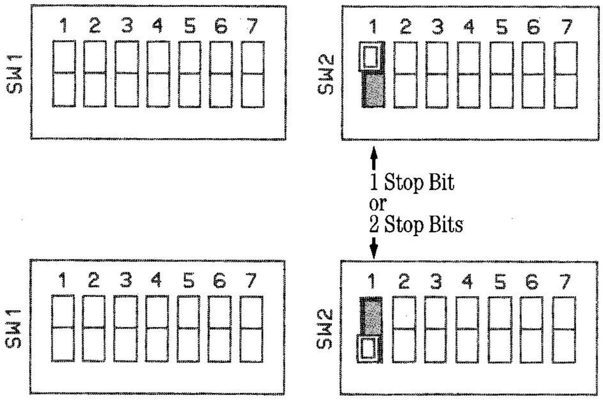


> ***By the Way:*** Don't worry about switch 1-7 for now. It will be discussed in the section "RS232C Signals."

Stop Bits

Switch 2-1 determines whether there will be one stop bit or two stop bits after each string of data bits. Set it to ON for one stop bit. Set it to OFF for two stop bits. In most cases, it should be set for one stop bit. See Figure 2-12.

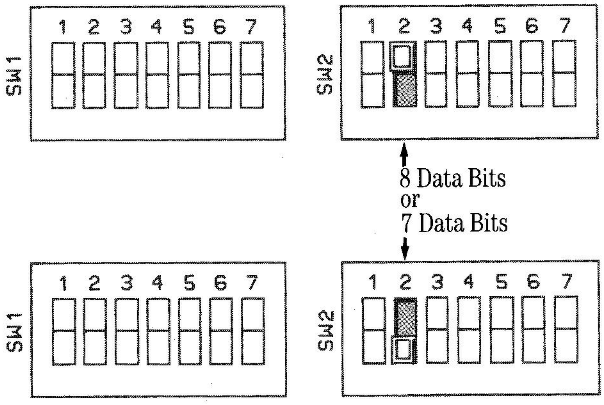
Figure 2-12. Stop Bit Switch Settings


SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
1 Stop Bit
or
2 Stop Bits

Data Bits

Switch 2-2 determines whether data bits will be sent and received in seven-bit strings or eight-bit strings. Set it to ON for eight data bits. Set it to OFF for seven data bits. In most cases, it should be set for seven data bits. See Figure 2-13.

Figure 2-13. Data Bit Switch Settings


SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
8 Data Bits
or
7 Data Bits

In printer mode, switches 2-3 and 2-4 control line width, not parity.

Parity

Switches 2-3 and 2-4 determine whether there will be a parity bit and, if there is, whether it will be odd parity or even parity. In most cases, it should be set for no parity. Table 2-4 shows you how to set the switches for the three parity options:

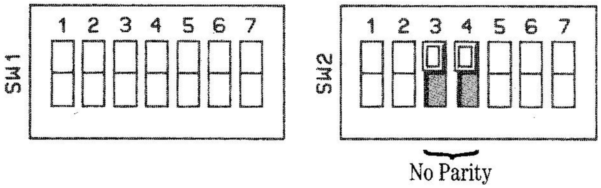
Table 2-4. Parity Switch Settings

Type of Parity	**Switch 2-3**	**Switch 2-4**
No parity	ON	ON
Odd parity	ON	OFF
Even parity	OFF	OFF

An Example

Figure 2-14 shows how to set switches 2-3 and 2-4 for no parity.

Figure 2-14. No Parity Setting

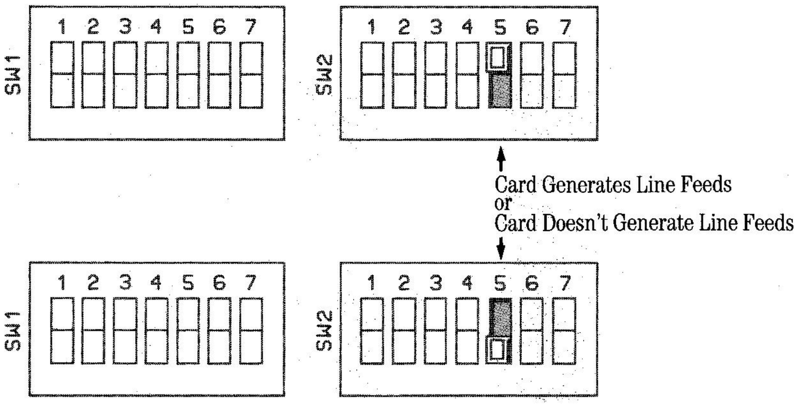


Generate Line Feeds

Switch 2-5 determines whether the card will generate a line feed after each carriage return. **Most of the time this switch should be set to OFF.** You need to flip it on only when there is a printer (attached to the computer at the other end of the phone line) that needs line feeds generated for it.

Set the switch to ON if you want the Super Serial Card to generate line feeds after carriage returns. Set it to OFF if the printer generates its own line feeds after carriage returns. See Figure 2-15.

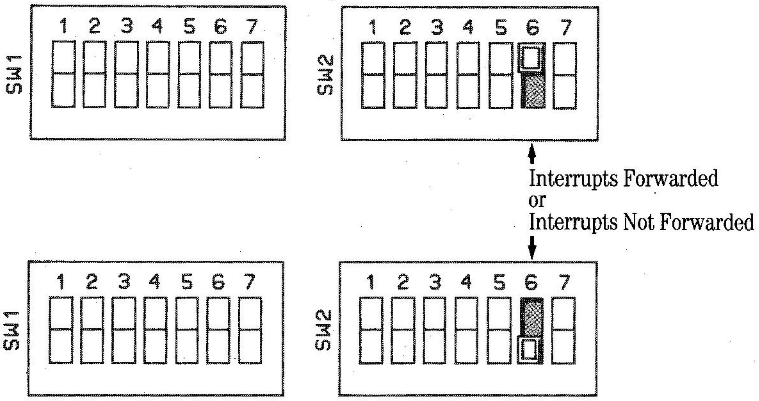
Figure 2-15. Line Feed Settings


SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
Card Generates Line Feeds
or
Card Doesn't Generate Line Feeds

Interrupts

Switch 2-6 controls forwarding of interrupts to the Apple IIe. Set it to ON if you want interrupts forwarded. Set it to OFF if you don't. In most cases it should be set to OFF. See Figure 2-16.

Figure 2-16. Interrupt Settings

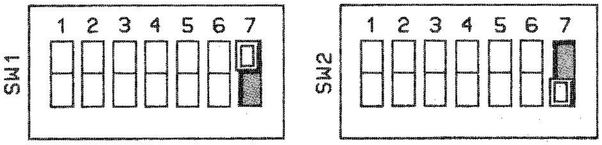

SW1
1 2 3 4 5 6 7
SW2
1 2 3 4 5 6 7
Interrupts Forwarded
or
Interrupts Not Forwarded

> ***About Interrupts:*** Apple II's, Apple II Pluses, and early models of Apple IIe's can't handle interrupts, so if you have one of those machines, switch 2-6 should be set to OFF.

RS232C Signals

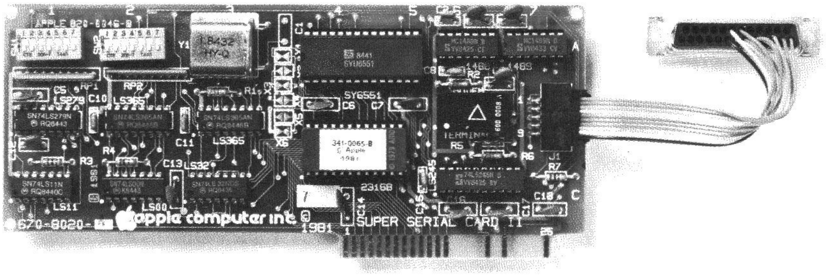
Switches 1-7 and 2-7 determine whether data will be exchanged in accordance with the RS232C standard (the norm for serial data) or according to some other protocol. Set 1-7 to ON and 2-7 to OFF unless the documentation tells you to set the switches some other way. See Figure 2-17.

Figure 2-17. RS232C Switch Settings



Appendix A

Troubleshooting



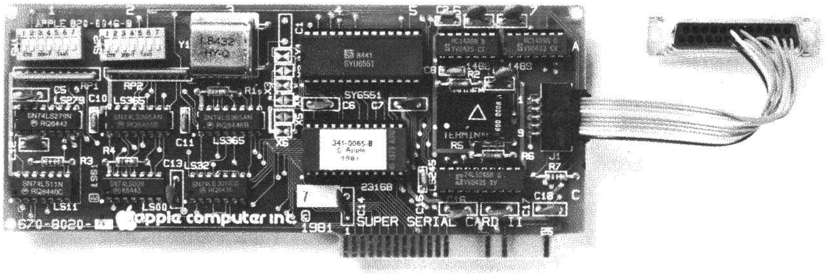
If you had to guess at any of the settings, don't be surprised if your first crack at setting the switches on your Super Serial Card didn't work. Here are some guidelines to help you decide which switches are wrong and what to do about it.

The most common cause of garbage (a string of characters that bear no resemblance to what you typed) is the wrong baud rate or the wrong data format. Other problems have distinctive symptoms that will suggest what the problem is and what you can do about it.

Symptom	**Solution**
Information isn't getting from your computer to your device in any form.	Make sure the cables are connected. Make sure that the jumper block is pointing the right way. Make sure the Super Serial Card is in the appropriate slot.
Garbage.	Try a different baud rate. Try a different number of data bits, stop bits, or a different kind of parity.
No line feeds.	Change the line feed switch (2-5) to ON.
Too many line feeds.	Change the line feed switch (2-5) to OFF.
Missing characters.	Change to a slower baud rate (from 1200 to 300).
Print runs off the page.	Change switches 2-3 and 2-4 to a narrower line width (printer mode only).
Computer isn't working.	If Super Serial Card is in slot 3, move it to slot 1 or 2.
Screen doesn't echo what you print.	Change switches 2-3 and 2-4 or use the Echo Enable command.

Appendix B

Super Serial Card Commands



Programmers can override switch settings on the Super Serial Card by imbedding commands within BASIC or Pascal programs or by typing commands at the keyboard under BASIC. The reference card at the back of this manual shows which commands override which switch settings.

To start a Super Serial Card command, use the appropriate CONTROL character:

- CONTROL-I for printer mode
- CONTROL-A for communications (modem) mode

To end the command, press RETURN.

Overriding Commands From a Program

In a BASIC program, put the control character and the command in a PRINT statement. In a Pascal program, put the control character and the command in a WRITE or WRITELN statement. For example, here's how you'd change the baud rate to 1200 in a BASIC program:

```
PRINT CHR$(9); "8B"
```

Here's how you'd change the baud rate to 1200 in a Pascal program:

```
WRITELN (CHR(9), '8B');
```

Overriding Commands From the Keyboard

To override switch settings from the keyboard:

1. Type `IN#s` (where *s* is the slot number that contains your Super Serial Card).
2. Type the appropriate control character (CONTROL-A for communications mode, CONTROL-I for printer mode).
3. Type the command.
4. Press RETURN.

Printer Commands

The group of commands discussed in this section either directly override the Super Serial Card switch settings or affect related behavior of the Super Serial Card. The Reset command restores the switch selections.

Important! Start each of the printer commands by pressing CONTROL-I and end the commands by pressing RETURN.

Baud Rate

Typing the command nB (where *n* is a number from 0 to 15) overrides the physical settings of switches 1-1 through 1-4 on the Super Serial Card. (See the reference card for the baud rates associated with the different numbers.) For example, to change the baud rate to 135 baud, type 4B.

Data Format

Typing the command nD (where *n* is a number from 0 to 7) overrides the settings of switches 2-1 and 2-2. The reference card shows how many data and stop bits correspond to each value of *n*. For example, typing 2D causes the Super Serial Card to transmit each character in this form: six data bits and one stop bit.

Parity

Typing the command nP (where *n* is a number from 0 to 7) determines the kind of parity the Super Serial Card will generate when sending data and check for when receiving data. In general, parity checking is not needed in printer mode. However, there are five parity options available. See the reference card for the type of parity associated with the different numbers.

For example, type 1P if you want the Super Serial Card to transmit and check for odd parity. Odd parity means that the high bit of every character is 0 if there is already an odd number of 1 bits in that character, or 1 if there is otherwise an even number of 1 bits in the character, making the total always odd. This is an easy (but not foolproof) way to check data for transmission errors.

Set Time Delays

Some printers are slow and do not provide a **printer busy**, or **handshake** signal to the Apple II. Typing the command `nC` (where *n* is a number from 0 to 3) causes the Apple II to delay a specified amount of time, after sending a carriage return character, before sending another group (usually another line) to it. (Consult the reference card for the length of delay associated with the various numbers.) The delay gives the print head enough time to return to the left side of the page so it is ready to continue printing. This command overrides the setting of switch 2-2 on the Super Serial Card, which provides only two choices: no delay or a 250 millisecond delay.

Typing the command `nL` (where *n* is a number from 0 to 3) allows time after a line feed character for a printer platen to turn so the paper is vertically positioned to receive the next line.

Typing the command `nF` (where *n* is a number from 0 to 3) allows time after a form feed character for the printer platen to move the paper form to the top of the next page (typically a longer time than a line feed).

Consult the user manual that came with the printer to find out how much time it takes to move its print head and platen. This will help you determine an appropriate set of values for these three delays. The idea is to have at least enough time for the printer parts to move the required distance, but not so much time that overall printing speed is slowed down drastically. A typical set for a *very* slow printer would be `2C`, `2L`, `3F`; that is, the Super Serial Card waits 250 milliseconds after transmitting carriage returns, 250 milliseconds after transmitting line feeds, and 2 seconds after transmitting form feed characters.

Generate Carriage Return on Column Overflow

Typing the command `C` causes the Super Serial Card to generate a carriage return character automatically any time the column count exceeds the printer line width.

> *By the Way:* Once this is on, only clearing the high-order bit at location $578+s (where *s* is the slot containing the Super Serial Card) can turn this option back off. This option is normally off.

Generate Line Feed

Be sure to type a space between the *L* and the *E* or *D*.

Typing the command `L E` (*L* stands for *Line Feed*; *E* stands for *Enable*) causes the Super Serial Card to automatically generate and transmit a line feed character after each carriage return character. This overrides the setting of switch 2-5. For example, you can type `L E` to cause your printer to print listings or double-spaced manuscripts for editing. To disable the command, type `L D` (*D* stands for *Disable*).

Mask Line Feed

Be sure to type a space between the *M* and the *E*.

Typing the command `M E` (*M* stands for *Mask*; *E* stands for *Enable*) causes the Super Serial Card to suppress any incoming line feed character that immediately follows a carriage return character.

Reset the Super Serial Card

Typing the command `R` has the same effect as sending a `PR#0` and an `IN#0` to a BASIC program and then resetting the Super Serial Card. This keyboard command cancels all previous commands to the Super Serial Card and puts the physical switch settings back into force.

Translate Lowercase Characters (Apple II and II Plus)

The Apple II Monitor ROM translates all incoming lowercase characters into uppercase ones before sending them to the video screen or to a BASIC program. The Super Serial Card offers four translation options:

Table B-1. Lowercase Character Displays

Typing This	**Gives You This**
0T	Change all lowercase characters to uppercase ones before passing them to a BASIC program or to the video screen. This is the way the Apple II Monitor ROM handles lowercase.
1T	Pass along all lowercase characters unchanged. The appearance of the lowercase characters on the Apple II screen is undefined (garbage).
2T	Display lowercase characters as uppercase inverse characters (that is, as dark characters on a light background).
3T	Pass lowercase characters to programs unchanged, but display lowercase as uppercase, and uppercase as inverse uppercase (that is, as dark characters on a light background).

Zap (Suppress) Control Characters

Typing the command `z` prevents the Super Serial Card from recognizing any further control characters (and hence commands) whether coming from the keyboard or contained in a stream of characters moving through the Super Serial Card.

If you issue the Zap command described here, all further commands are ignored; this is useful if the data you are transmitting contain bit patterns that the Super Serial Card can mistake for control characters.

Important!

> The only way to reinstate command recognition after the Zap command is to reinitialize the Super Serial Card, or clear the high-order bit at location $5F8+s (where *s* is the slot in which the Super Serial Card is installed).

Find Keyboard

Be sure to type a space between the *F* and the *D* or *E*.

Typing the command `F D` (*F* stands for *Find Keyboard*; *D* stands for *Disable*) protects incoming data from disruption by keystrokes. For example, you can include a Find Keyboard command in a program, followed by a routine that retrieves data coming in through the Super Serial Card, followed by `F E` (for *Enable*) later in the program. The default is `F E`.

XOFF Recognition

Be sure to type a space between the *X* and the *E* or *D*.

Typing the command `X E` (*X* stands for *XOFF*; *E* stands for *Enable*) causes the Super Serial Card to look for any XOFF (decimal 19) character coming from a device attached to the Super Serial Card, and to respond to it by halting transmission of characters until the Super Serial Card receives an XON (decimal 17) from the device, signaling the Super Serial Card to continue transmission. In printer mode, the default value of this command is `X D` (for *Disable*).

> ***By the Way:*** In printer mode, full duplex communication may not work with XOFF recognition turned on, so be careful.

Tab in BASIC

Be sure to type a space between the *T* and the *E*.

Typing the command `T E` (*T* stands for *Tab*; *E* stands for *Enable*), leaves the BASIC horizontal position counter equal to the column count. All Tabs work, including back-tabs. Tabs beyond column 40 require a POKE to location 36, as usual. Commas work only as far as column 40, and BASIC programs will be listed in 40-column format.

Modem (Communications) Commands

The commands discussed in this section either override the Super Serial Card switch settings or affect related behavior of the Super Serial Card. The Reset command restores the switch selections.

> Start each of the modem commands by pressing CONTROL-A and end the commands by pressing RETURN.

Baud Rate

Typing the command `nB` (where *n* is a number from 0 to 15) overrides the physical settings of switches 1-1 through 1-4 on the Super Serial Card. (See the reference card for the baud rates associated with the different numbers.) For example, to change the rate to 9600 baud, type `14B`.

Data Format

Typing the command `nD` (where *n* is a number from 0 to 7) overrides the settings of switches 2-1 and 2-2. (See the reference card for the data formats associated with the different numbers.) For example, typing `3D` causes the Super Serial Card to transmit each character in this form: five data bits, and one stop bit.

Parity

Typing the command `nP` (where *n* is a number from 0 to 7) determines the kind of parity the Super Serial Card generates when sending data and checks for when receiving data. There are five parity options available. (See the reference card for the parity options associated with each number.)

For example, type `1P` if you want the Super Serial Card to transmit and check for odd parity. Odd parity means that the high bit of every character is 0 if there is already an odd number of 1 bits in that character, or 1 if there is otherwise an even number of 1 bits, making the total always odd.

Generate Line Feed

Be sure to type a space between the *L* and the *E*.

Typing the command `L E` (*L* stands for *Line Feed*; *E* stands for *Enable*) causes the Super Serial Card to automatically generate and transmit a line feed character after each carriage return character. This overides the setting of switch 2-5. For example, you can type `L E` to cause a remote printer to produce double-spaced listings or manuscripts for editing.

Mask Line Feed

Be sure to type a space between the *M* and the *D*.

If you type the command `M D` (*M* for *Mask*; *D* for *Disable*), the Super Serial Card will not remove incoming line feed characters that immediately follow carriage return characters.

Reset the Super Serial Card

Typing the command `R` has the same effect as sending a `PR#0` and an `IN#0` to a BASIC program and then resetting the Super Serial Card. This keyboard command cancels all previous commands to the Super Serial Card and puts the physical switch settings back into force.

Set Time Delays

Some printers are slow and do not provide a **printer busy**, or **handshake** signal to the Apple II. If such a printer is connected to the Super Serial Card via a modem, you may want to use these three delay commands.

Typing the command `nC` (where *n* is a number from 0 to 3) causes the Apple II to delay a specified amount of time, after sending a carriage return character, before sending another group (usually another line) to it. (See the reference card for the amount of delay associated with each number). This gives the print head enough time to return to the left side of the page so it is ready to continue printing.

Typing the command `nL` (where *n* is a number from 0 to 3) allows time after a line feed character for a printer platen to turn so the paper is vertically positioned to receive the next line. (See the reference card for the amount of delay associated with each number.)

Typing the command `nF` (where *n* is a number from 0 to 3) allows time after a form feed character for the printer platen to move the paper form to the top of the next page (typically a longer time than a line feed). (See the reference card for the amount of delay associated with each number.)

Consult the user manual that came with the printer to find out how much time it takes to move its print head and platen. This will help you determine an appropriate set of values for these three delays if a printer is used as the remote device. The idea is to have at least enough time for the printer parts to move the required distance, but not so much time that overall printing speed is slowed down drastically.

Translate Lowercase Characters (Apple II and II Plus)

The Apple II Monitor ROM translates all incoming lowercase characters into uppercase ones before sending them to the video screen or to a BASIC program. The Super Serial Card offers four translation options:

Table B-2. Lowercase Character Displays

Typing This	**Gives You This**
`0T`	Change all lowercase characters to uppercase before passing them to a BASIC program or to the video screen. This is what the Apple II Monitor ROM does to lowercase.
`1T`	Pass along all lowercase characters unchanged. The appearance of the lowercase characters on the Apple II screen is undefined (garbage).
`2T`	Display lowercase characters as uppercase inverse characters (that is, as dark characters on a light background).
`3T`	Pass lowercase characters to programs unchanged, but display lowercase as uppercase, and uppercase as inverse uppercase (that is, as dark characters on a light background).

Zap (Suppress) Control Characters

Typing the command `Z` prevents the Super Serial Card from recognizing any further control characters (and hence commands) in the stream of characters moving through the Super Serial Card.

If you issue the Zap command, all further commands are ignored; this is useful if the data you are transmitting contain bit patterns that the Super Serial Card can mistake for control characters.

Important!

The only way to reinstate command recognition after invoking the Zap command is to reset the Super Serial Card, or clear the high-order bit at location $5F8+s (with the Super Serial Card in slot *s*).

Find Keyboard

Be sure to type a space between the *F* and the *D* or *E*.

Typing the command `F D` (*F* stands for *Find Keyboard*; *D* stands for *Disable*) protects incoming data from disruption by keystrokes.

For example, you can include `F D` in a program, followed by a routine that retrieves data coming in through the Super Serial Card, followed by `F E` (for *Enable*) later in the program.

XOFF Recognition

Be sure to type a space between the *X* and the *D*.

In communications mode, the Super Serial Card automatically recognizes any XOFF (decimal 19) character coming from a device attached to it, and responds to it by halting transmission of characters. The Super Serial Card resumes transmission as soon as it receives an XON character (decimal 17) from the device. To disable XOFF recognition, type `X D` (*X* stands for *XOFF*; *D* stands for *Disable*).

Specify Screen Slot (Apple II and II Plus)

Typing the command `sS` (where *s* is the slot number of a display device) chains the Super Serial Card to another card slot, such as a slot containing an 80-column card. (Normally this is slot 0, the Apple II video screen.) For the firmware in the Super Serial Card to pass on information to the firmware in the other card, the other card must have an output entry point within its Cs00 space; this is the case for all currently available 80-column cards for the Apple II.

For example, let's say you have the Super Serial Card in slot 2 with a remote terminal connected to it, and an 80-column card in slot 3. Type `3S` to cause the data from the remote terminal to be chained through the card in slot 3, so that it is displayed on the Apple II in 80-column format. This command is not available in Pascal.

Echo Characters on the Screen

For the Apple II, as for most computers, displaying (echoing) a character on the video screen is a separate step from receiving it from the keyboard, though you tend to think of these as one step, as on a typewriter. For example, if you type `E D` (*E* stands for *Echo*; *D* stands for *Disable*), the Super Serial Card does not forward incoming characters to the Apple II screen. This can be used to hide someone's password entered at a terminal, or to avoid double-display of characters.

Be sure to type a space between the *E* and the *D*.

Terminal Mode

Under communications mode, the Super Serial Card can enter terminal mode and make the Apple II act like an dumb terminal. This is useful for connecting the Apple II to a computer time-sharing service, or for conversing with another Apple II.

Typing Lowercase Characters (Apple II and II Plus)

Terminal mode makes it possible to generate lowercase characters, plus the ten ASCII characters not provided on the Apple II keyboard (plus ESCAPE, since ESC is used for this feature).

To generate lowercase characters, press ESC once, and then type alphabetic characters as you would normally do. After that, to capitalize a single letter, press ESC again before typing the letter. To lock the keyboard in uppercase, press ESC twice in succession. To get back to lowercase, press ESC once, as before.

To generate one of the special ASCII characters listed below, first press ESC once (if necessary) to place the keyboard in lowercase mode. Then press ESC a second time, followed by one of the top-row keys shown below.

For example, to send a tilde, make sure the keyboard is in lowercase mode, then type ESC followed by 9.

ESC followed by:	1	2	3	4	5	6	7	8	9	0	:
Generates:	FS	US	[	\	_	{	|	}	~	ESC	RUB
Or in hexadecimal:	9C	9F	DB	DC	DF	FB	FC	FD	FE	9B	FF

Enter Terminal Mode

Typing the command `T` causes the Apple II to function as a full-duplex dumb terminal. You can use this command in conjunction with the Echo command to simulate the half-duplex terminal mode of the old Apple II Communications Card.

> *By the Way:* If you enter terminal mode and don't see what you type echoed on the Apple video screen, probably the modem link has not yet been established, or you need to use the E E command. (The first *E* stands for *Echo*; the second *E* stands for *Enable.*)

Transmit a Break Signal

Typing the command `B` causes the Super Serial Card to transmit a 233-millisecond break signal, recognized by most time-sharing systems as a signoff.

Special Characters

Be sure to type a space between the *S* and the *E* or *D*.

Typing the command `S E` (*S* stands for *Special Characters*; *E* stands for *Enable*) causes the Super Serial Card to interpret ESC n pairs as special characters, allowing a keyboard in this way to generate all possible ASCII characters. If you type `S D` (*D* stands for *Disable*), the Super Serial Card will treat ESC like any other key.

Quit Terminal Mode

Type the command `Q` to exit from terminal mode.

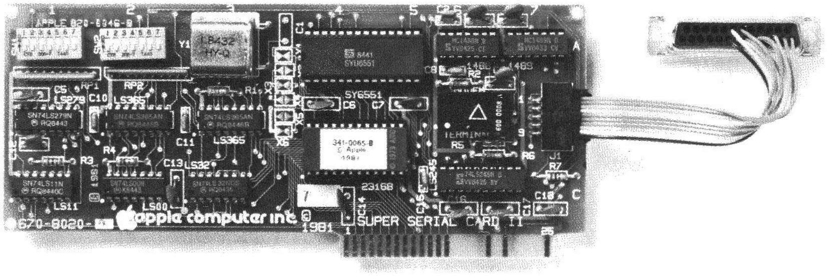
A Terminal Mode Example

You can use the following sample program to change the Super Serial Card temporarily from the characteristics you ordinarily use to the characteristics needed to make the Apple II into a dumb terminal connected to the *Dow Jones News & Quote Reporter*. This program assumes that the Super Serial Card is set for communications mode and that the jumper block is pointing toward *MODEM*. Neither of these conditions can be changed by software. This program also assumes that the Super Serial Card is in slot 1 and that you want to chain I/O to an 80-column card; these conditions you can change via software.

```
10 REM
*****************************************************
20 REM *    THIS PROGRAM SETS UP THE Super Serial
Card FOR DOW JONES     *
30 REM
*****************************************************
40 D$=CHR$(4)
42 A$=CHR$(1)
50 PRINT D$;"PR#1":       REM  Super Serial Card IS
IN SLOT #1;
52 PRINT A$;"6 BAUD":     REM  SET BAUD RATE TO 300;
54 PRINT A$;"1 DATA":     REM  DATA FORMAT OF 7 DATA,
1 STOP
56 PRINT A$;"0 PARITY":   REM  AND NO PARITY;
58 PRINT A$;"LF DISABLE": REM  NO <LF> GENERATION
AFTER <CR>.
60 PRINT A$;"3 SLOTCHN":  REM  CHAIN TO CARD IN SLOT
#3
62 PRINT A$;"TERM MODE":  REM  AND ENTER TERMINAL
MODE.
70 REM
*****************************************************
72 REM * NOW YOU SHOULD BE IN TERMINAL MODE, GETTING
THE   *
74 REM * INFO YOU NEED FROM THE DOW JONES SERVICE.
WHEN   *
76 REM * FINISHED, EXIT WITH THE <CTRL-A>Q(UIT
COMMAND.    *
78 REM
*****************************************************
100 REM  Q(UIT COMMAND SENDS CONTROL BACK TO THIS
PROGRAM:
110 PRINT A$;"RESET":      REM  RESET SWITCH-SELECTED
OPTIONS
120 END
```

Appendix C

Firmware



This appendix contains the following information:

- ☐ an explanation of the Pascal 1.1 firmware card protocol (which also applies to later versions of Pascal)
- ☐ a list of firmware entry points and 6502 register values

Pascal 1.1 Firmware Protocol

The old Apple II Serial Interface Card (SIC) ran under Pascal 1.0 with three direct firmware entry points, one for each of the three I/O functions it supported:

Address	**Contains**
$C800	initialization routine entry point
$C84D	read routine entry point
$C9AA	write routine entry point

New peripheral cards can be accepted into the Pascal 1.0 system by appearing to be a SIC—that is, with these same three entry points and with $38 at $Cs05 and $18 at $Cs07 (see "Device Identification" later in this appendix).

Pascal 1.1 and later versions of Pascal, on the other hand, are more flexible, and also support more I/O functions. They can make indirect calls to the firmware in a (new) peripheral card through addresses in a branch table in the card's firmware. They also have facilities for identifying new peripheral I/O devices.

Entry Points

The I/O routine entry point branch table is located near the beginning of the Cs00 address space (*s* being the slot number where the peripheral card is installed). This space was chosen instead of the $C800 space because under BASIC protocol the $Cs00 space is required, while the $C800 space is optional.

The branch table locations that Pascal 1.1 and later versions of Pascal use are:

Address	**Contains**
$Cs0D	initialization routine offset (required)
$Cs0E	read routine offset (required)
$Cs0F	write routine offset (required)
$Cs10	status routine offset (required)
$Cs11	$00 if optional offsets follow; non-zero if not
$Cs12	control routine offset (optional)
$Cs13	interrupt handling routine offset (optional)

Notice that $Cs11 contains $00 only if the control and interrupt handling routines are supported by the firmware. (For example, the Super Serial Card does not support these two routines, and so location $Cs11 contains a non-zero firmware instruction.) Apple II Pascal 1.0 and 1.1 do not support control and interrupt requests, but such requests may be implemented in future versions of the Pascal BIOS and other future Apple II operating systems.

Here are the entry point addresses and the contents of the 6502 registers on entry to and on exit from Pascal 1.1 (and later versions of Pascal) I/O routines:

Table C-1. I/O Routine Offsets and Registers Under Pascal 1.1

Address	Offset for	X Register	Y Register	A Register
$Cs0D	Initialization			
	On entry	$Cs	$s0	
	On exit	error code	(unchanged)	(unchanged)
$Cs0E	Read			
	On entry	$Cs	$s0	
	On exit	error code	(unchanged)	character read
$Cs0F	Write			
	On entry	$Cs	$s0	char. to write
	On exit	error code	(unchanged)	(unchanged)
$Cs10	Status			
	On entry	$Cs	$s0	request (0 or 1)
	On exit	error code	(unchanged)	(unchanged)

> *Note:* Request code 0 means "Are you ready to accept output?" Request code 1 means "Do you have input ready?" On exit, the reply to the status request is in the carry bit: carry clear means "No"; carry set means "Yes."

Device Identification

Pascal 1.1 and later versions of Pascal use four firmware bytes to identify the peripheral card. Both the identifying bytes and the branch table are near the beginning of the $Cs00 ROM space. The identifiers are listed in Table C-2.

Table C-2. Bytes Used for Device Identification

Address	**Value**
$Cs05	$38 (like the old Serial Interface Card)
$Cs07	$18 (like the old Serial Interface Card)
$Cs0B	$01 (the Generic Signature of new FW cards)
$Cs0C	$ci (the Device Signature; see Table C-3)

The first digit, *c*, of the Device Signature byte identifies the device class as listed in Table C-3.

Table C-3. Device Class Digit

Digit	**Class**
$0	reserved
$1	printer
$2	joystick or other X-Y input device
$3	serial or parallel I/O card
$4	modem
$5	sound or speech device
$6	clock
$7	mass storage device
$8	80-column card
$9	network or bus interface
$A	special purpose (none of the above)
$B-F	reserved for future expansion

The second digit, *i*, of the Device Signature byte is a unique identifier for the card, assigned by Apple Technical Support. For example, the Super Serial Card has a Device Signature of $31: the 3 signifies that it is a serial or parallel I/O card, and the 1 is the low-order digit supplied by Apple Technical Support.

Although version 1.1 and later versions of Pascal ignore the Device Signature, application programs can use them to identify specific devices.

Super Serial Card Entry Points

This section contains the Super Serial Card firmware entry points for BASIC, Pascal 1.0, and Pascal 1.1 (which also applies to later versions of Pascal). The Pascal 1.1 entry point offsets conform to the Firmware card protocol outlined in the first section of this appendix.

BASIC Entry Points

Here are the entry point addresses and the contents of the 6502 registers on entry to and on exit from BASIC I/O routines:

Table C-4. BASIC Entry Points Used by the Super Serial Card

Address	**Routine**	**X Register**	**Y Register**	**A Register**
$Cs00	Initialization[1]			
	On entry	anything	anything	anything
	On exit	(unchanged)	(unchanged)	
$Cs05	Input[2]			
	On entry	anything	anything	anything
	On exit	(unchanged)	(unchanged)	character in
$Cs07	Output[3]			
	On entry	anything	anything	character out
	On exit	(unchanged)	(unchanged)	(changed)

[1] CSW and/or KSW points to $Cs00. The character in the A register is output unless KSW points to $Cs00 and CSW does not point to $Cs00.

[2] Character in is from ACIA or keyboard.

[3] Character out is transmitted through the ACIA.

Pascal 1.0 Entry Points

There are three Pascal 1.0 entry points: one for initialization, one for read operations, and one for write operations. These entry points are direct addresses.

Table C-5. Pascal 1.0 Entry Points Used by the Super Serial Card

Address	Routine	X Register	Y Register	A Register
$C800	Initialization[1]			
	On entry	$Cs	$s0	anything
	On exit	$Cs	$s0	(unchanged)
$C84D	Read[2]			
	On entry	$Cs	$s0	anything
	On exit	$Cs	$Cs	character in
$C9AA	Write[3]			
	On entry	$Cs	$s0	character out
	On exit	error code	$Cs	(changed)

[1] $C800 space is enabled. Firmware initializes the Super Serial Card to default values plus switch selections.

[2] $C800 space is enabled. Pascal returns ACIA or keyboard datain the A Register and location $678+s with high bit cleared.

[3] $C800 space is enabled. Output character is transmitted through the ACIA. Pascal posts error code to IORESULT.

Pascal 1.1 Entry Points

The Pascal 1.1 entry point protocol is outlined in the first section of this appendix. The values given here are the addresses of the routines. Unlike Pascal 1.0, later versions of Pascal enter these routines using indirect addressing.

Table C-6. Pascal 1.1 Offsets Used by the Super Serial Card

Address	**Offset for**	**Value**	**X Register**	**Y Register**	**A Register**
$Cs0D	Initialization[1]	$(Cs)8E			
	On entry		$Cs	$s0	anything
	On exit		$00	$s0	(changed)
$Cs0E	Read[2]	$(Cs)94			
	On entry		$Cs	$s0	anything
	On exit		error code	$Cs	char. in
$Cs0F	Write[3]	$(Cn)97			
	On entry		$Cs	$s0	char. out
	On exit		error code	$Cs	(changed)
$Cs10	Status[4]	$(Cs)9A			
	On entry		$Cs	$s0	request (0 or 1)
	On exit		error code	$s0	error code

[1] $C800 space is enabled. Firmware initializes the Super Serial Card to default values plus switch selections.

[2] $C800 space is enabled. Character in from ACIA or keyboard is returned in the A Register.

[3] $C800 space is enabled. The byte in the A Register is sent out through the ACIA.

[4] $C800 space is enabled. Request = 0 asks ACIA whether it is ready to transmit another byte; request = 1 asks ACIA whether it has an input character available. On exit, carry bit = 0 for Yes or 1 for No.

Glossary

ASCII: Stands for *American Standard Code for Information Interchange*. Pronounced *ask' ee*. It's a standard defining the 128 codes that represent all the letters, numbers, and punctuation marks on the keyboard.

baud: A designation for how fast peripheral devices can receive and/or send data. Sometimes referred to as *bits per second.*

binary: The representation of numbers in terms of powers of two, using the two digits 0 and 1. Commonly used in computers because the values 0 and 1 can easily be represented in physical form in a variety of ways, such as the presence or absence of current, positive or negative voltage, or a white or black dot on a display screen. A single binary digit—a 0 or 1—is called a **bit**.

bit: The word *bit* is a contraction of the words *binary digit*, and that's what a bit is—a 0 or a 1.

carriage return: An ASCII character that causes a printer or display screen to place the next character typed on the left margin. On a typewriter, this movement is combined with a line feed (the advancement of the paper to the next line). With computers, the carriage return and line feed are separate—causing hair-raising problems for the user.

character: A letter, number, or punctuation mark.

communications mode: A mode is a manner of operating. Communications mode is the manner of operating for modems.

data: Information, especially raw or unprocessed information, used or operated on by a program.

data bits: A set of seven or eight bits that represent a character.

data format: The way that data is sent between the computer and a peripheral device. See **data bits**, **stop bits**, and **parity**.

device: A printer, modem, or other piece of equipment attached to the computer.

echo: To send an input character to the screen, the printer, or other output device. On a typewriter, what you type on the keyboard appears on the page in the same step. With a computer, these two steps are controlled separately.

even parity: Use of an extra bit set to either 0 or 1 to make the total number of 1 bits an *even* number. For example, the 7-bit ASCII code for the letter *A* is 1000001. It has two 1 bits. For even parity, the transmitting device adds a 0 parity bit so that the total number of 1 bits remains even. The receiving device counts the 1 bits as a way of checking for transmission errors. Compare **odd parity**.

handshake signal: A kind of communications protocol in which the receiving device, when it has successfully received a character or block of characters, sends back an acknowledging signal, thereby triggering the next transmission.

input: Information transferred into a computer from some external source, such as the keyboard, a disk drive, or a modem. The act of transferring such information.

interface: The devices, rules, or conventions by which one component of a system communicates with another.

interrupt: A special control signal from an outside device that diverts the Apple II from the program it's executing so it can handle the condition that caused the interruption.

jumper block: A plastic plug with pins connected in such a way that it passes signals between the Super Serial Card and the device either unchanged (for modems) or altered (for printers).

line feed: An ASCII character that causes a printer or display to advance to the next line.

local: Nearby. Capable of direct connection using wires only.

mode: Manner of operating. The Super Serial Card can operate in printer mode or communications (modem) mode.

modem: A contraction of *modulator/demodulator*. It's a device that links your computer to other computers over the phone lines.

odd parity: Use of an extra bit set to 0 or 1 to make the total number of 1 bits an odd number. For example, the 7-bit ASCII code for the letter *A* is 1000001. It has two 1 bits. For odd parity, the transmitting device adds an eighth bit equal to 1, making the total number of 1 bits odd. The receiving device can check for transmission errors by counting 1 bits. If the total comes out odd, there was no error. If the total comes out even, there was an error. Compare **even parity**.

output: Information transferred from a computer to some external destination, such as the display screen, a disk drive, a printer, or a modem.

parallel interface: A type of connection between devices that allows the devices to send eight bits of data at a time. The data travel on eight parallel wires. Compare **serial interface**.

parity: A way of checking to see if data made it from one device to another without getting bits bungled. See **even parity** and **odd parity**.

plotter: A device that produces paper copies of graphs and other drawings created with a computer graphics program.

printer busy signal: See **handshake signal**.

printer mode: A mode is a manner of operating. When the Super Serial Card is in printer mode, it's set up to operate with a printer.

remote computer: A computer other than your Apple II, but connected to it, either directly or through modems and telephone lines. A remote computer can be at any distance from the Apple II, from right beside it to thousands of miles away.

RS232C: A standard created by the Electronic Industries Association to allow devices from different manufacturers to exchange serial data—particularly over the phone lines.

serial interface: A type of connection between devices in which information is sent one bit at a time—along one wire. This makes it possible for devices to exchange information across phone lines. Compare **parallel interface**.

stop bits: Special bits that signal the end of characters (data bits).

Super Serial Card: The interface card described in this manual. It's called *super* because it can simultaneously transmit and receive data in one of 35 formats at any of 15 speeds.

terminal: An input/output device usually made up of a keyboard and a video display. It can receive and display information from a computer system.

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20525 Mariani Avenue
Cupertino, California 95014
408 996-1010
TLX 171-576

030-1258-C
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Printed in Singapore